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REMARKS

I. INTRODUCTION

In response to the Office Action dated April 6, 2006, which was made final, and in conjunction with the Request for Continued Examination (RCE) submitted herewith, claims 1, 8, 11, 18, 21 and 28 have been amended. Claims 1-30 remain in the application. Re-examination and re-consideration of the application, as amended, is requested.

II. INFORMATION DISCLOSURE STATEMENT

Applicants' attorney submitted an Information Disclosure Statement (IDS) on October 16, 2001. However, Applicants' attorney never received an initialed Form PTO-1449.

The Office Action dated April 6, 2006 did include a copy of the Form PTO-1449 with the Examiner's signature, but the references listed therein are not initialed.

Applicants' attorney requests that the Examiner initial the references listed in the Form PTO-1449 and return the initialed Form PTO-1449 to Applicants' attorney.

III. PRIOR ART REJECTIONS

In paragraphs (3)-(4) of the Office Action, claims 1-2, 4-9, 11-12, 14-19, 21-22, and 24-29 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,691,312 (Sen) in view of U.S. Patent No. 6,014,694 (Aharoni) and further in view of U.S. Patent No. 6,658,056 (Duruöz). In paragraph (5) of the Office Action, claims 3, 13, and 23 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sen in view of U.S. Patent No. 6,510,553 (Hazra). In paragraph (6) of the Office Action, claims 10, 20, and 30 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sen in view of U.S. Patent No. 6,343,348 (Tremblay).

Applicants' attorney respectfully traverses the rejections. The Applicants' invention, as recited in independent claims 1, 8, 11, 18, 21 and 28, is patentable over the references because the claims recite limitations not shown by the references. Moreover, Applicants' attorney submits that there are clear errors in the Office Action's rejections and further, the rejections fail to establish essential elements needed for prima facie obviousness.

According to the Office Action, however, Sen, Aharoni and Duruöz, when combined, teach all the elements of the independent claims 1, 8, 11, 18, 21 and 28. Duruöz is the reference at issue, and the portions of Duruöz cited by the Office Action are set forth below:

Duruöz: Col. 6, lines 5-35 (actually, col. 5, line 66 – page 6, line 35)

A particular objective of the present invention is to provide an efficient and effective system and method for performing frame rate conversions such as, for example, 3-2 pull down conversions including pull down in VCD and DVD and NTSC-PAL or PAL-NTSC conversions. More particular objectives of the invention include providing for such 3-2 pull down while facilitating the use of commands such as pause, fast-forward, slow forward, reverse play and other such commands which are often referred to as "trick play" commands. Such objectives also include implementing frame skipping required in audio-visual synchronization.

Another objective of the present invention is to provide in an MPEG video decoder one module and routine to handle frame rate conversions and other frame rate related issues, as well as frame rate related issues that are dependent on the amount of available buffer memory of the system in which the decoder is used. A further objective of the present invention is to provide an MPEG video decoder that performs a single decompression and transformation method regardless of the occurrence of frame rate conversion and the conversion rate and regardless of differences in the display sequences due to the frame rate conversion, if any, employed, or due to buffer memory size.

A further objective of the present invention is to efficient and effective use of buffer memory and to facilitate the use of minimally sized buffer memory to buffer decoded video picture sequences for display during regular play, where frame rate conversions are required for program viewing, and during trick play modes and transitions into and out of trick play modes, particularly while maintaining optimal display quality. An additional objective of the invention is to provide a memory management system operative to map decoded pictures to buffer memory and allocate buffer memory so as to allow for the sharing of memory locations by more than one field in a way that reduces memory requirements.

Duruöz: Col. 9, lines 54-59 (actually, lines 45-59)

The FIFO buffers 63 are part of the random access DRAM 48, but are caused to function as first-in/first-out ring memory by the programming of the DMUX 53 and the memory controller 50. These FIFO buffers 63 have read and write pointers which automatically determine the addresses to and from which the next write and read commands write and read. The positions of these read and write pointers can be read by the RISC 61 and can be set by the RISC 61. As a result, the RISC 61 can move a read pointer of, for example, video FIFO 67 to repeat or skip a picture, and can suppress the advance of the write pointer to prevent or cause a picture from being overwritten to facilitate the repeating skipping, or reordering of pictures where desired. This accommodates frame rate conversions and certain trick play modes.

Duruöz: Col. 11, lines 40-65 (actually, lines 29-67)

According to the preferred embodiment of the invention, the RISC 61 includes field sequence control logic 80 to control the order of field data to the buffer 78, including the performance of frame rate conversions. Conversions that are made include, for example, 3-2 pull down conversions from 20 or 24 frame per second VCD or DVD to 25 frame per second PAL or 30 frame per second NTSC, as well as NTSC-to-PAL and PAL-to-NTSC conversions. The conversions are

implemented while facilitating the use of commands such as pause, or may be suspended during other commands such as fast-forward, slow forward, reverse play and other trick play modes. In addition, the field sequence control logic 80 includes field repeat routine logic for determining the repeating of fields to be done when frame rate conversions so require, and for implementing frame skipping in audio-visual synchronization and in other situations where frame skipping is required.

This field sequence control logic 80 is contained in a single module within the RISC 61 which, along with a field sequence attribute setting subroutine 96, includes the entire routine needed to handle frame rate conversions and other frame rate related issues. In addition, the control logic 80 controls other frame rate related issues that are dependent on the amount of buffer memory provided by the many various forms of systems 30 in which the ASIC 40 is used. The control logic 80 controls these issues by determining the appropriate field display sequence, synchronizing the operation of the decoder 56, instructing the DMUX 53 if necessary, and mapping and timing the storing of decoded video slice data to the output buffer 78 to carry out the field display sequence that the control logic 80 determines is appropriate. The control logic 80 allows a single decompression and transformation method regardless of the occurrence of frame rate conversion and regardless of the determined field display sequence or the inclusion therein of field repetition or field skipping. It accommodates output field buffers 78 that are one frame in size and buffers that are smaller, such as output buffers 78 that are only one or a few block-rows larger than one half frame (one field).

Duruöz: Col. 16, lines 13-45

The sequence control logic 80 determines the need for frame rate conversion and controls these functions so as to regulate the adding or skipping of fields or frames to bring about any frame rate conversion that is required to match the input video frame rate to that of the display 34. The sequence control logic 80 regulates the display sequence of the fields in response to information in the picture data bitstream and in accordance with configuration information and commands from the host. The information from the host to which the control logic 80 includes configuration data relating to the size of the output buffer 78, information regarding the format of the receiver (e.g., NTSC, PAL, etc.) and commands such as trick play mode commands (e.g., pause, fast-forward, reverse, etc.).

The sequence control 80 determines the order in which fields are to be decoded and when and to where in the buffer memory 78 decoded slices are to be written. It controls when the video decoder 56 decodes these slices and tells the decoder 56 to which rows of blocks of the output buffer 78 the decoded slices are to be written. The control logic 80 stores information regarding the locations in the buffer memory 78 of the various rows of data from the various fields of the input pictures in tables 82 in the buffer memory 42. From information in the video bitstreams, or where the bitstream does not contain the information by making certain default assumptions, it determines the display sequence of the fields of the received pictures. Where the frame display rate required of the display 34 differs from that at which the original received program was recorded, the control logic 80 specifies which fields are either repeated or skipped to make the display of the picture sequence acceptable, and where possible, MPEG compliant.

The above portions of Duruöz merely describe performing frame rate conversions such as, for example, 3-2 pull down conversions between different video formats, including pull down in VCD and DVD and NTSC-PAL or PAL-NTSC conversions (e.g., conversions from 20 or 24 frame per second VCD or DVD to 25 frame per second PAL or 30 frame per second NTSC, as well as NTSC-to-PAL and PAL-to-NTSC conversions). In Duruöz, the frame rate conversion requires the adding or skipping of fields or frames. The frame skipping performed by Duruöz relates only to such conversions, as well as "trick play" commands, such as pause, fast-forward, slow forward, reverse play, etc.

However, nothing in the above portions of Duruöz teach or suggest skipping frames on the basis of network bandwidth availability. The Office Action ignores the limitations directed to network bandwidth availability when maintaining the rejections, asserting that this is proper when making the "broadest reasonable interpretation of the claim." However, the interpretation is not reasonable when it ignores the limitations in their entirety.

Specifically, Duruöz does not teach or suggest the amended limitations of claims 1, 11 and 21 directed to displaying selected frames from said frame source, on said display means, at their correct time based on the frame rate in order to maintain timing integrity of the clip by skipping frames in said frame sequence in response to an indication of the data transfer rate of said network, so that a loss of network bandwidth availability results in a degradation in smoothness of the clip, not a modification of the rate at which recorded events in the clip unfold. In addition, Duruöz does not teach or suggest the amended limitations of claims 8, 18 and 28 directed to (a) selecting a next frame for preloading by skipping at least one frame in the clip's frame sequence in response to an indication of the data transfer rate of said network, preloading a frame from said frame source into a frame queue in said memory means, displaying a preloaded frame at its correct time based on the frame rate in order to maintain timing integrity of the clip, processing elapsed real time since the clip started playing with a frame timing parameter, and updating the number of frames to skip in response to said processing of elapsed real time.

None of the other references overcome the deficiencies of Duruöz with regard to skipping frames on the basis of network bandwidth availability. Instead, Sen merely describes a method of multicasting video to multiple client nodes via intermediate nodes that includes smoothed transmission schedules, while Aharoni merely describes adaptively transporting video over networks where the available bandwidth varies with time, Hazra merely describes providing a picture-in-

picture (PIP) display for streaming digital video, and Tremblay merely describes a multi-ported register file.

As a result, when combined, Sen, Aharoni, Duruöz, Hazra and Tremblay do not teach or suggest all the elements of Applicants' claimed invention. Moreover, the various elements of Applicants' claimed invention together provide operational advantages over Sen, Aharoni, Duruöz, Hazra and Tremblay. In addition, Applicants' invention solves problems not recognized by Sen, Aharoni, Duruöz, Hazra and Tremblay.

Thus, Applicants' attorney submit that independent claims 1, 8, 11, 18, 21 and 28 are allowable over Sen, Aharoni, Duruöz, Hazra and Tremblay. Further, dependent claims 2-7, 9-10, 12-17, 19-20, 22-27, 29 and 30 are submitted to be allowable over Sen, Aharoni, Duruöz, Hazra and Tremblay in the same manner, because they are dependent on independent claims 1, 8, 11, 18, 21 and 28, respectively, and thus contain all the limitations of the independent claims. In addition, dependent claims 2-7, 9-10, 12-17, 19-20, 22-27, 29 and 30 recite additional novel elements not shown by Sen, Aharoni, Duruöz, Hazra and Tremblay.

IV. CONCLUSION

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited.

Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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